

# Decommissioning of nuclear facilities in France

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# The decommissioning scene in France in 2008



- In 2008, more than 30 civilian facilities are shutdown or under decommissioning:
  - ✓ Research facilities (labs, reactors, waste treatment facilities...)
  - ✓ First generation NPP
  - ✓ Fuel cycle facilities, including reprocessing plant



Fontenay aux Roses research center



Saint-Laurent Gas Cooled Reactors

# France decommissioning challenges

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- Demonstrate that nuclear industry masters the end life of nuclear cycle
  - technical, economical, safety, radioprotection and environmental requirements
- Demonstrate that the decommissioning provisions are adequate
- Set up the industrial and regulatory organisation in order to prepare the decommissioning of the operating plants
- Develop synergies within the different groups
- Accumulate technical and industrial experience feedback

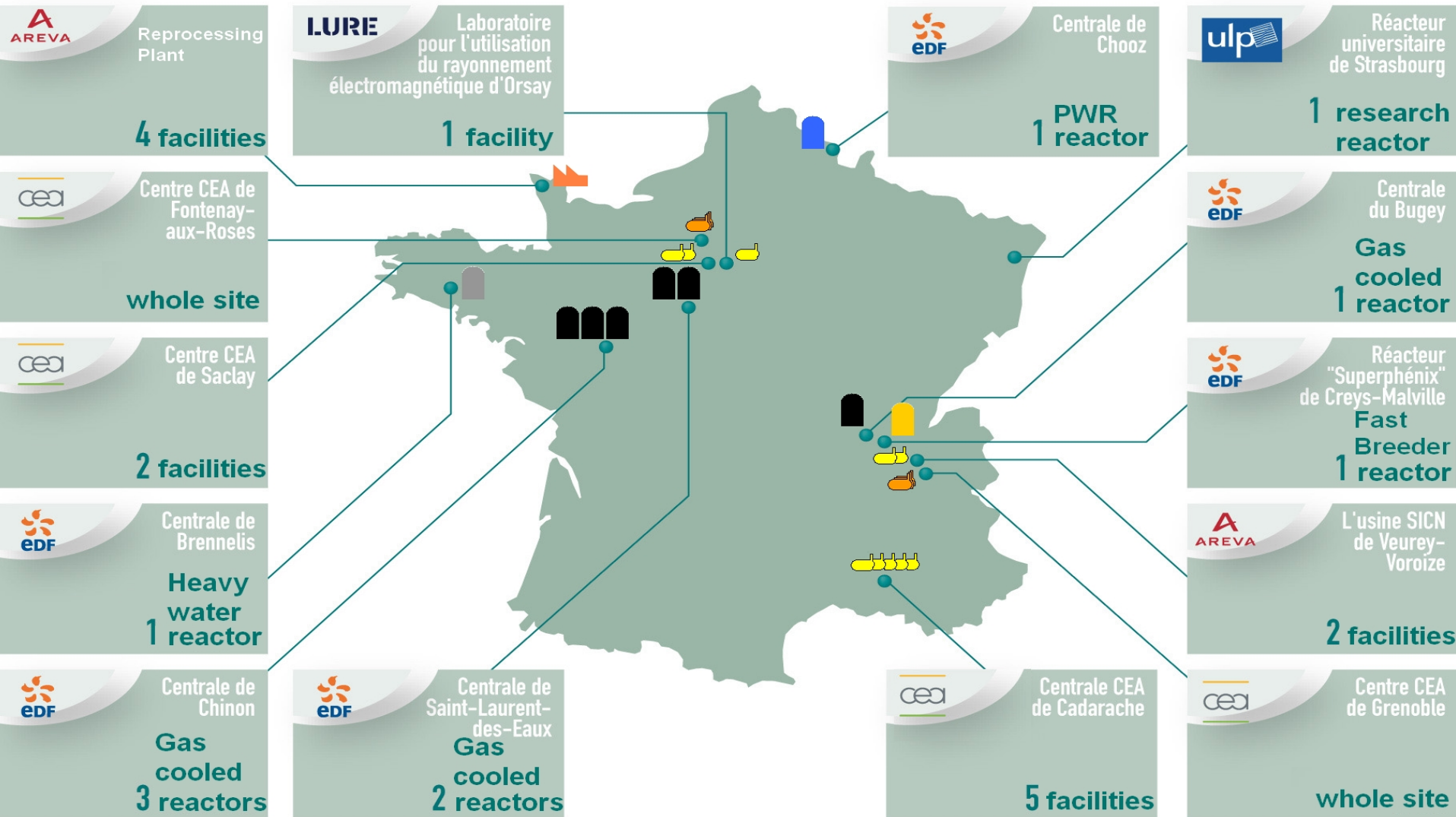
# France decommissioning strategy

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- Launch cleaning and decommissioning studies **before shutdown decision**
- **Make CDE and MAD operations** (POCO, radioactive cleaning) **as soon as possible after shutdown**, while using the operating staff, for :
  - benefit of **experienced** operating staff
  - send back as quickly as possible the **R&D** team to R&D activities
  - solve **cleaning and cleansing** problems
  - get to **minimum operating costs**
  - get to **optimised safety classification**
- Spread or postpone in time **DECOM partial** or **DECOM total** (demolishing), while financing **wastes shipments to existing depositories**

# The decommissioning scene in France in 2008



# ASN Policy regarding decommissioning

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- Draft document issued at the beginning of 2008:
  - Informs all stakeholders
  - The public was consulted (ASN website)
  - Gives recommendations and general statements
- Main topics addressed:
  - Public information
  - Decommissioning strategies
  - End-states



*Harmonie reactor, CEA*

# Recent changes in French regulations

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- First decommissioning framework introduced in 1990
  - ✓ Very few specific requirements
- Specific requirements introduced in 2003
  - ✓ One license instead of 2 or 3

2006 Act on Transparency and Security in the nuclear field  
“TSN Act”

Captures and improves former good practices and regulations in the field of decommissioning

# New contributions of the TSN Act

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- Licensing procedure is clearly stated
- Public enquiry is required in the decommissioning licensing process
- New documents are required
- Decommissioning plan
  - ✓ Must be produced as soon as a facility is commissione
  - ✓ Must be kept up-to-date during entire facility life-cycl



# New contributions of the TSN Act

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- Operators have to demonstrate both their technical and financial capabilities
- ASN has the possibility to implement use restrictions
  - ✓ Even after declassification, in case of a threat to the environment or persons health
- The internal authorizations system has been included in the law
  - ✓ Allows operator to authorize internally small modification

# Decommissioning cost evaluation

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- 2006 Act on sustainable management of radioactive materials and waste enforces operators:
  - to define a decommissioning , spent fuel and waste management strategy
  - to implement to associated funding system

Reports addressing these topics must be submitted every three years to public authorities



# ASN's role in the cost evaluation process

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- *General Directorate for Energy and Climate* (ministry of environment) leads the control of operators' cost evaluations DGEC
- ASN evaluates consistency of operators' strategies with nuclear safety and waste management policies

# ASN's role in the cost evaluation process

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- ASN's methodology to evaluate operators' strategies is focused on 4 main points:
  - Operators' decommissioning strategies
  - Dismantling technical scenarios
  - Strategy regarding retrieval, treatment, and conditioning of legacy waste
  - Waste management principles

# ASN's role in the cost evaluation process

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- First conclusions of operators' report assessment:
  - Dismantling scenarios and shutdown dates are not always known
  - Evaluation of waste volumes is not always addressed
  - Technical uncertainties and project risk are not addressed



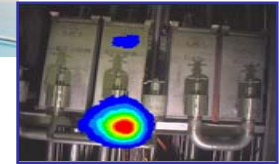
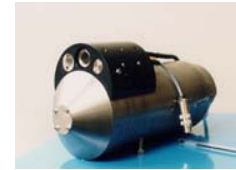
2007 was the first try operators and authorities

The iterative process will allow progressive improvements

# Decommissioning Techniques



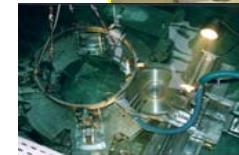
- Nuclear measurements
- Decontamination
- Tools / Remote operation
- Simulations



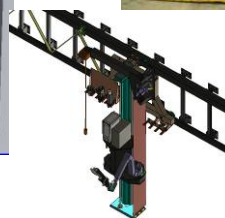
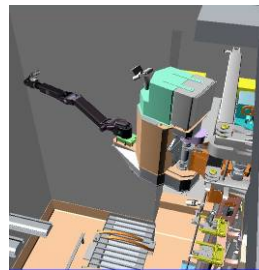
- Decontamination



- Tools / Remote operation



- Simulations



# Conclusions and perspectives

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- French regulatory framework has changed considerably since the 1990's:
  - Dismantling & Decommissioning
  - Spent fuel and waste management
- This regulatory framework:
  - Allows a **comprehensive view** of decommissioning until restricted/unrestricted release
  - Ensures the necessary **flexibility** to carry out operations
  - Improves the **financing** system regarding decommissioning and waste management

# Conclusions and perspectives

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- ASN checks that operators' strategies are part of an overall process
- Significance of decommissioning programs underway requires careful planning, taking into account:
  - Aging facilities management
  - Choices of technical scenarios
  - Availability of approved disposal routes
  - Management of waste streams
  - Management of uncertainties, organizational and project risks

# Conclusions and perspectives

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- In the near future, ASN will continue the work undertaken after the publication of the two 2006 acts
  - Updating guidance related to decommissioning
  - Developing an evaluation method regarding tools and assumptions used by operators to evaluate the cost of decommissioning and waste disposal.

# Conclusion

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## The key factors for successful decommissioning

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- **An efficient industrial organisation**
- **Clear and stable regulations and licensing process**
- **Waste management from production to final disposal**
- **Available and adequate funding**
- **Communication and transparency**
- **Share experience (OECD, IAEA, EC, workshops, ...)**

# Questions?

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